

Preliminary Classification:

Proposed Class:

Subclass:

NOTE: "All applicants are requested to include a preliminary classification on newly filed patent applications. The preliminary classification, preferably class and subclass designations, should be identified in the upper right-hand corner of the letter of transmittal accompanying the application papers, for example 'Proposed Class 2, subclass 129.'" M.P.E.P. § 601, 7th ed.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Box Patent Application
Assistant Commissioner for Patents
Washington, D.C. 20231

NEW APPLICATION TRANSMITTAL

Transmitted herewith for filing is the patent application of

Inventor(s): Klaus MULLER

WARNING: 37 C.F.R. § 1.41(a)(1) points out:

"(a) A patent is applied for in the name or names of the actual inventor or inventors.

"(1) The inventorship of a nonprovisional application is that inventorship set forth in the oath or declaration as prescribed by § 1.63, except as provided for in § 1.53(d)(4) and § 1.63(d). If an oath or declaration as prescribed by § 1.63 is not filed during the pendency of a nonprovisional application, the inventorship is that inventorship set forth in the application papers filed pursuant to § 1.53(b), unless a petition under this paragraph accompanied by the fee set forth in § 1.17(f) is filed supplying or changing the name or names of the inventor or inventors."

For (title): ELECTRICAL PLUG CONNECTOR PARTICULARLY FOR AUTOMOTIVE APPLICATIONS

CERTIFICATION UNDER 37 C.F.R. § 1.10*

(Express Mail label number is mandatory.)

(Express Mail certification is optional.)

I hereby certify that this New Application Transmittal and the documents referred to as attached therein are being deposited with the United States Postal Service on this date 19 May 2000, in an envelope as "Express Mail Post Office to Addressee," mailing Label Number EL336865191US, addressed to the: Assistant Commissioner for Patents, Washington, D.C. 20231.

Debra G. Conrad

(type or print name of person mailing paper)

Debra G. Conrad

Signature of person mailing paper

WARNING: Certificate of mailing (first class) or facsimile transmission procedures of 37 C.F.R. § 1.8 cannot be used to obtain a date of mailing or transmission for this correspondence.

***WARNING:** Each paper or fee filed by "Express Mail" must have the number of the "Express Mail" mailing label placed thereon prior to mailing. 37 C.F.R. § 1.10(b).

"Since the filing of correspondence under § 1.10 without the Express Mail mailing label thereon is an oversight that can be avoided by the exercise of reasonable care, requests for waiver of this requirement will not be granted on petition." Notice of Oct. 24, 1996, 60 Fed. Reg. 56,439, at 56,442.

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1. Type of Application

This new application is for a(n)

(check one applicable item below)

☒ Original (nonprovisional)

☐ Design

☐ Plant

WARNING: Do not use this transmittal for a completion in the U.S. of an International Application under 35 U.S.C. § 371(c)(4), unless the International Application is being filed as a divisional, continuation or continuation-in-part application.

WARNING: Do not use this transmittal for the filing of a provisional application.

NOTE: If one of the following 3 items apply, then complete and attach **ADDED PAGES FOR NEW APPLICATION TRANSMITTAL WHERE BENEFIT OF A PRIOR U.S. APPLICATION CLAIMED** and a **NOTIFICATION IN PARENT APPLICATION OF THE FILING OF THIS CONTINUATION APPLICATION**.

☐ Divisional.

☐ Continuation.

☐ Continuation-in-part (C-I-P).

2. Benefit of Prior U.S. Application(s) (35 U.S.C. §§ 119(e), 120, or 121)

NOTE: A nonprovisional application may claim an invention disclosed in one or more prior filed copending nonprovisional applications or copending international applications designating the United States of America. In order for a nonprovisional application to claim the benefit of a prior filed copending nonprovisional application or copending international application designating the United States of America, each prior application must name as an inventor at least one inventor named in the later filed nonprovisional application and disclose the named inventor's invention claimed in at least one claim of the later filed nonprovisional application in the manner provided by the first paragraph of 35 U.S.C. § 112. Each prior application must also be:

(i) An international application entitled to a filing date in accordance with PCT Article 11 and designating the United States of America; or

(ii) Complete as set forth in § 1.51(b); or

(iii) Entitled to a filing date as set forth in § 1.53(b) or § 1.53(d) and include the basic filing fee set forth in § 1.16; or

(iv) Entitled to a filing date as set forth in § 1.53(b) and have paid therein the processing and retention fee set forth in § 1.21(f) within the time period set forth in § 1.53(f).

37 C.F.R. § 1.78(a)(1).

NOTE: If the new application being transmitted is a divisional, continuation or a continuation-in-part of a parent case, or where the parent case is an International Application which designated the U.S., or benefit of a prior provisional application is claimed, then check the following item and complete and attach **ADDED PAGES FOR NEW APPLICATION TRANSMITTAL WHERE BENEFIT OF PRIOR U.S. APPLICATION(S) CLAIMED**.

WARNING: If an application claims the benefit of the filing date of an earlier filed application under 35 U.S.C. §§ 120, 121 or 365(c), the 20-year term of that application will be based upon the filing date of the earliest U.S. application that the application makes reference to under 35 U.S.C. §§ 120, 121 or 365(c). (35 U.S.C. § 154(a)(2) does not take into account, for the determination of the patent term, any application on which priority is claimed under 35 U.S.C. §§ 119, 365(a) or 365(b).) For a c-i-p application, applicant should review whether any claim in the patent that will issue is supported by an earlier application and, if not, the applicant should consider canceling the reference to the earlier filed application. The term of a patent is not based on a claim-by-claim approach. See Notice of April 14, 1995, 60 Fed. Reg. 20,195, at 20,205.

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WARNING: When the last day of pendency of a provisional application falls on a Saturday, Sunday, or Federal holiday within the District of Columbia, any nonprovisional application claiming benefit of the provisional application must be filed prior to the Saturday, Sunday, or Federal holiday within the District of Columbia. See 37 C.F.R. § 1.78(a)(3).

- ☐ The new application being transmitted claims the benefit of prior U.S. application(s). Enclosed are ADDED PAGES FOR NEW APPLICATION TRANSMITTAL WHERE BENEFIT OF PRIOR U.S. APPLICATION(S) CLAIMED.

3. Papers Enclosed

- A. Required for filing date under 37 C.F.R. § 1.53(b) (Regular) or 37 C.F.R. § 1.153 (Design) Application

10 Pages of specification

2 Pages of claims

4 Sheets of drawing

WARNING: DO NOT submit original drawings. A high quality copy of the drawings should be supplied when filing a patent application. The drawings that are submitted to the Office must be on strong, white, smooth, and non-shiny paper and meet the standards according to § 1.84. If corrections to the drawings are necessary, they should be made to the original drawing and a high-quality copy of the corrected original drawing then submitted to the Office. Only one copy is required or desired. For comments on proposed then-new 37 C.F.R. § 1.84, see Notice of March 9, 1988 (1990 O.G. 57-62).

NOTE: "Identifying indicia, if provided, should include the application number or the title of the invention, inventor's name, docket number (if any), and the name and telephone number of a person to call if the Office is unable to match the drawings to the proper application. This information should be placed on the back of each sheet of drawing a minimum distance of 1.5 cm. (5/8 inch) down from the top of the page . . ." 37 C.F.R. § 1.84(c).

(complete the following, if applicable)

- ☐ The enclosed drawing(s) are photograph(s), and there is also attached a "PETITION TO ACCEPT PHOTOGRAPH(S) AS DRAWING(S)." 37 C.F.R. § 1.84(b).
- ☐ formal
- ☐ informal

B. Other Papers Enclosed

 Pages of declaration and power of attorney

1 Pages of abstract

 Other

4. Additional papers enclosed

- ☐ Amendment to claims
- ☐ Cancel in this applications claims _____ before calculating the filing fee. (At least one original independent claim must be retained for filing purposes.)
- ☐ Add the claims shown on the attached amendment. (Claims added have been numbered consecutively following the highest numbered original claims.)
- ☐ Preliminary Amendment
- ☒ Information Disclosure Statement (37 C.F.R. § 1.98)
- ☒ Form PTO-1449 (PTO/SB/08A and 08B)
- ☒ Citations

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- ☐ Declaration of Biological Deposit
- ☐ Submission of "Sequence Listing," computer readable copy and/or amendment pertaining thereto for biotechnology invention containing nucleotide and/or amino acid sequence.
- ☐ Authorization of Attorney(s) to Accept and Follow Instructions from Representative
- ☐ Special Comments
- ☐ Other

5. Declaration or oath (including power of attorney)

NOTE: A newly executed declaration is not required in a continuation or divisional application provided that the prior nonprovisional application contained a declaration as required, the application being filed is by all or fewer than all the inventors named in the prior application, there is no new matter in the application being filed, and a copy of the executed declaration filed in the prior application (showing the signature or an indication thereon that it was signed) is submitted. The copy must be accompanied by a statement requesting deletion of the names of person(s) who are not inventors of the application being filed. If the declaration in the prior application was filed under § 1.47, then a copy of that declaration must be filed accompanied by a copy of the decision granting § 1.47 status or, if a nonsigning person under § 1.47 has subsequently joined in a prior application, then a copy of the subsequently executed declaration must be filed. See 37 C.F.R. §§ 1.63(d)(1)-(3).

NOTE: A declaration filed to complete an application must be executed, identify the specification to which it is directed, identify each inventor by full name including family name and at least one given name, without abbreviation together with any other given name or initial, and the residence, post office address and country or citizenship of each inventor, and state whether the inventor is a sole or joint inventor. 37 C.F.R. § 1.63(a)(1)-(4).

- ☐ Enclosed

Executed by

(check all applicable boxes)

- ☐ inventor(s).
- ☐ legal representative of inventor(s).
37 C.F.R. §§ 1.42 or 1.43.
- ☐ joint inventor or person showing a proprietary interest on behalf of inventor who refused to sign or cannot be reached.
 - ☐ This is the petition required by 37 C.F.R. § 1.47 and the statement required by 37 C.F.R. § 1.47 is also attached. See item 13 below for fee.

- ☒ Not Enclosed.

NOTE: Where the filing is a completion in the U.S. of an International Application or where the completion of the U.S. application contains subject matter in addition to the International Application, the application may be treated as a continuation or continuation-in-part, as the case may be, utilizing ADDED PAGE FOR NEW APPLICATION TRANSMITTAL WHERE BENEFIT OF PRIOR U.S. APPLICATION CLAIMED.

- ☒ Application is made by a person authorized under 37 C.F.R. § 1.41(c) on behalf of all the above named inventor(s).

(The declaration or oath, along with the surcharge required by 37 C.F.R. § 1.16(e) can be filed subsequently).

- ☐ Showing that the filing is authorized.
(not required unless called into question. 37 C.F.R. § 1.41(d))

6. Inventorship Statement

WARNING: If the named inventors are each not the inventors of all the claims an explanation, including the ownership of the various claims at the time the last claimed invention was made, should be submitted.

The inventorship for all the claims in this application are:

☐ The same.

or

☐ Not the same. An explanation, including the ownership of the various claims at the time the last claimed invention was made,

☐ is submitted.

☐ will be submitted.

7. Language

NOTE: An application including a signed oath or declaration may be filed in a language other than English. An English translation of the non-English language application and the processing fee of \$130.00 required by 37 C.F.R. § 1.17(k) is required to be filed with the application, or within such time as may be set by the Office. 37 C.F.R. § 1.52(d).

☒ English

☐ Non-English

☐ The attached translation includes a statement that the translation is accurate. 37 C.F.R. § 1.52(d).

8. Assignment

☒ An assignment of the invention to Framatome Connectors International

☐ is attached. A separate ☐ "COVER SHEET FOR ASSIGNMENT (DOCUMENT) ACCOMPANYING NEW PATENT APPLICATION" or ☐ FORM PTO 1595 is also attached.

☒ will follow.

NOTE: "If an assignment is submitted with a new application, send two separate letters—one for the application and one for the assignment." Notice of May 4, 1990 (1114 O.G. 77-78).

WARNING: A newly executed "CERTIFICATE UNDER 37 C.F.R. § 3.73(b)" must be filed when a continuation-in-part application is filed by an assignee. Notice of April 30, 1993, 1150 O.G. 62-64.

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9. Certified Copy

Certified copy(ies) of application(s)

Country	Appln. No.	Filed
Germany	DE 19923386	21 May 1999

Country	Appln. No.	Filed
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Country	Appln. No.	Filed
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from which priority is claimed

☐ Is (are) attached.

☒ will follow.

NOTE: The foreign application forming the basis for the claim for priority must be referred to in the oath or declaration. 37 C.F.R. § 1.55(a) and 1.63.

NOTE: This item is for any foreign priority for which the application being filed directly relates. If any parent U.S. application or International Application from which this application claims benefit under 35 U.S.C. § 120 is itself entitled to priority from a prior foreign application, then complete item 18 on the ADDED PAGES FOR NEW APPLICATION TRANSMITTAL WHERE BENEFIT OF PRIOR U.S. APPLICATION(S) CLAIMED.

10. Fee Calculation (37 C.F.R. § 1.16)

A. ☒ Regular application

CLAIMS AS FILED						
Number filed			Number Extra	Rate		Basic Fee 37 C.F.R. § 1.16(a) \$ 690.00
Total						
Claims (37 C.F.R. § 1.16(c))	9	- 20 =	0	×	\$ 18.00	0
Independent						
Claims (37 C.F.R. § 1.16(b))	1	- 3 =	0	×	\$ 78.00	0
Multiple dependent claim(s), if any (37 C.F.R. § 1.16(d))				+	\$260.00	

☐ Amendment cancelling extra claims is enclosed.

☐ Amendment deleting multiple-dependencies is enclosed.

☐ Fee for extra claims is not being paid at this time.

NOTE: If the fees for extra claims are not paid on filing they must be paid or the claims cancelled by amendment, prior to the expiration of the time period set for response by the Patent and Trademark Office in any notice of fee deficiency. 37 C.F.R. § 1.16(d).

Filing Fee Calculation \$ 690.00

B. ☐ Design application
(\$310.00—37 C.F.R. § 1.16(f))

Filing Fee Calculation \$

C. ☐ Plant application
(\$480.00—37 C.F.R. § 1.16(g))

Filing fee calculation \$

11. Small Entity Statement(s)

- ☐ Statement(s) that this is a filing by a small entity under 37 C.F.R. § 1.9 and 1.27 is (are) attached.

WARNING: "Status as a small entity must be specifically established in each application or patent in which the status is available and desired. Status as a small entity in one application or patent does not affect any other application or patent, including applications or patents which are directly or indirectly dependent upon the application or patent in which the status has been established. The refiling of an application under § 1.53 as a continuation, division, or continuation-in-part (including a continued prosecution application under § 1.53(d)), or the filing of a reissue application requires a new determination as to continued entitlement to small entity status for the continuing or reissue application. A nonprovisional application claiming benefit under 35 U.S.C. § 119(e), 120, 121, or 365(c) of a prior application, or a reissue application may rely on a statement filed in the prior application or in the patent if the nonprovisional application or the reissue application includes a reference to the statement in the prior application or in the patent or includes a copy of the statement in the prior application or in the patent and status as a small entity is still proper and desired. The payment of the small entity basic statutory filing fee will be treated as such a reference for purposes of this section." 37 C.F.R. § 1.28(a)(2).

WARNING: "Small entity status must not be established when the person or persons signing the . . . statement can unequivocally make the required self-certification." M.P.E.P., § 509.03, 6th ed., rev. 2, July 1996 (emphasis added).

(complete the following, if applicable)

- ☐ Status as a small entity was claimed in prior application
_____ / _____, filed on _____, from which benefit
is being claimed for this application under:

35 U.S.C. § ☐ 119(e),
☐ 120,
☐ 121,
☐ 365(c),

and which status as a small entity is still proper and desired.

- ☐ A copy of the statement in the prior application is included.

Filing Fee Calculation (50% of A, B or C above)

\$ _____

NOTE: Any excess of the full fee paid will be refunded if small entity status is established and a refund request are filed within 2 months of the date of timely payment of a full fee. The two-month period is not extendable under § 1.136. 37 C.F.R. § 1.28(a).

12. Request for International-Type Search (37 C.F.R. § 1.104(d))

(complete, if applicable)

- ☐ Please prepare an international-type search report for this application at the time when national examination on the merits takes place.

13. Fee Payment Being Made at This Time

☐ Not Enclosed

☐ No filing fee is to be paid at this time.

(This and the surcharge required by 37 C.F.R. § 1.16(e) can be paid subsequently.)

☒ Enclosed

☒ Filing fee \$ 690.00

☐ Recording assignment
(\$40.00; 37 C.F.R. § 1.21(h))
(See attached "COVER SHEET FOR
ASSIGNMENT ACCOMPANYING NEW
APPLICATION".) \$ _____

☐ Petition fee for filing by other than all the
inventors or person on behalf of the inventor
where inventor refused to sign or cannot be
reached
(\$130.00; 37 C.F.R. §§ 1.47 and 1.17(i)) \$ _____

☐ For processing an application with a
specification in
a non-English language
(\$130.00; 37 C.F.R. §§ 1.52(d) and 1.17(k)) \$ _____

☐ Processing and retention fee
(\$130.00; 37 C.F.R. §§ 1.53(d) and 1.21(l)) \$ _____

☐ Fee for international-type search report
(\$40.00; 37 C.F.R. § 1.21(e)) \$ _____

NOTE: 37 C.F.R. § 1.21(f) establishes a fee for processing and retaining any application that is abandoned for failing to complete the application pursuant to 37 C.F.R. § 1.53(f) and this, as well as the changes to 37 C.F.R. §§ 1.53 and 1.78(a)(1), indicate that in order to obtain the benefit of a prior U.S. application, either the basic filing fee must be paid, or the processing and retention fee of § 1.21(f) must be paid, within 1 year from notification under § 53(f).

Total fees enclosed \$ 690.00

14. Method of Payment of Fees

☒ Check in the amount of \$ 690.00

☐ Charge Account No. _____ in the amount of
\$ _____

A duplicate of this transmittal is attached.

NOTE: Fees should be itemized in such a manner that it is clear for which purpose the fees are paid. 37 C.F.R. § 1.22(b).

15. Authorization to Charge Additional Fees

WARNING: If no fees are to be paid on filing, the following items should not be completed.

WARNING: Accurately count claims, especially multiple dependent claims, to avoid unexpected high charges, if extra claim charges are authorized.

- ☒ The Commissioner is hereby authorized to charge the following additional fees by this paper and during the entire pendency of this application to Account No. 16-1350:

☒ 37 C.F.R. § 1.16(a), (f) or (g) (filing fees)

☒ 37 C.F.R. § 1.16(b), (c) and (d) (presentation of extra claims)

NOTE: Because additional fees for excess or multiple dependent claims not paid on filing or on later presentation must only be paid or these claims cancelled by amendment prior to the expiration of the time period set for response by the PTO in any notice of fee deficiency (37 C.F.R. § 1.16(d)), it might be best not to authorize the PTO to charge additional claim fees, except possibly when dealing with amendments after final action.

☒ 37 C.F.R. § 1.16(e) (surcharge for filing the basic filing fee and/or declaration on a date later than the filing date of the application)

☒ 37 C.F.R. § 1.17(a)(1)-(5) (extension fees pursuant to § 1.136(a)).

☐ 37 C.F.R. § 1.17 (application processing fees)

NOTE: ". . . A written request may be submitted in an application that is an authorization to treat any concurrent or future reply, requiring a petition for an extension of time under this paragraph for its timely submission, as incorporating a petition for extension of time for the appropriate length of time. An authorization to charge all required fees, fees under § 1.17, or all required extension of time fees will be treated as a constructive petition for an extension of time in any concurrent or future reply requiring a petition for an extension of time under this paragraph for its timely submission. Submission of the fee set forth in § 1.17(a) will also be treated as a constructive petition for an extension of time in any concurrent reply requiring a petition for an extension of time under this paragraph for its timely submission." 37 C.F.R. § 1.136(a)(3).

☐ 37 C.F.R. § 1.18 (issue fee at or before mailing of Notice of Allowance, pursuant to 37 C.F.R. § 1.311(b))

NOTE: Where an authorization to charge the issue fee to a deposit account has been filed before the mailing of a Notice of Allowance, the issue fee will be automatically charged to the deposit account at the time of mailing the notice of allowance. 37 C.F.R. § 1.311(b).

NOTE: 37 C.F.R. § 1.28(b) requires "Notification of any change in status resulting in loss of entitlement to small entity status must be filed in the application . . . prior to paying, or at the time of paying, . . . the issue fee. . . ." From the wording of 37 C.F.R. § 1.28(b), (a) notification of change of status must be made even if the fee is paid as "other than a small entity" and (b) no notification is required if the change is to another small entity.

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16. Instructions as to Overpayment

NOTE: "... Amounts of twenty-five dollars or less will not be returned unless specifically requested within a reasonable time, nor will the payer be notified of such amounts; amounts over twenty-five dollars may be returned by check or, if requested, by credit to a deposit account." 37 C.F.R. § 1.26(a).

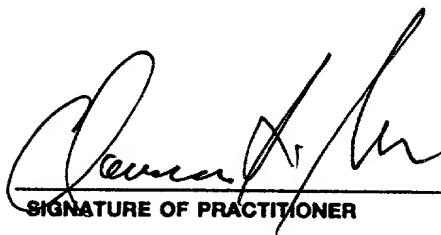
- ☒ Credit Account No. 16-1350
☐ Refund

SEND ALL CORRESPONDENCE TO:

Reg. No. 24,622

Tel. No. (203) 259-1800

Customer No.



SIGNATURE OF PRACTITIONER

Clarence A. Green

(type or print name of attorney)

PERMAN & GREEN, LLP

P.O. Address

425 Post Road, Fairfield, Connecticut 06430

☐ **Incorporation by reference of added pages**

(check the following item if the application in this transmittal claims the benefit of prior U.S. application(s) (including an international application entering the U.S. stage as a continuation, divisional or C-I-P application) and complete and attach the ADDED PAGES FOR NEW APPLICATION TRANSMITTAL WHERE BENEFIT OF PRIOR U.S. APPLICATION(S) CLAIMED)

- ☐ Plus Added Pages for New Application Transmittal Where Benefit of Prior U.S. Application(s) Claimed

Number of pages added _____

- ☐ Plus Added Pages for Papers Referred to in Item 4 Above

Number of pages added _____

- ☐ Plus added pages deleting names of inventor(s) named in prior application(s) who is/are no longer inventor(s) of the subject matter claimed in this application.

Number of pages added _____

- ☐ Plus "Assignment Cover Letter Accompanying New Application"

Number of pages added _____

☒ **Statement Where No Further Pages Added**

(if no further pages form a part of this Transmittal, then end this Transmittal with this page and check the following item)

- ☒ This transmittal ends with this page.

Electrical plug connector particularly for automotive applications

- The invention concerns an electrical plug connector, in particular for automotive applications with a cylindrical plug, a counterplug which is complementary thereto and a bayonet ring which is rotatable about the housing of the counterplug for the locking of the plug into the counterplug. Such plug connectors are preferably located in the wall of a housing in order to link the electrical connectors of a device located within the housing with outside current conductors. For example, such plug connectors are used as gearbox pre-cabling.
- Especially in the area of motor vehicle gearboxes there occur, apart from relatively high operating temperatures, strong vibrations that may lead to the loosening of the plug connector.
- In order to make the plug connector safe from becoming loosened, existing plug connectors have control systems which are intended to lock the plug into the counterplug. For example, such plugs have a bayonet ring as a locking device. Care must be taken during fitting to ensure that the locking device really *is* locked into place. It can however happen in practice that during the process of plug insertion such a rotation movement of the bayonet ring is undesirable. In this way, the plugs can be arranged in difficult to reach narrow areas of a gearbox housing where whilst the rotating movement is possible it is time-consuming because the bayonet ring is, for example, difficult to grip.
- The task of the invention is that of creating an electrical plug which is simple to assemble and dismantle, even in areas, which are accessible with difficulty.

This task is accomplished by means of the characteristics of patent Claim 1.

- The electrical plug connector according to the invention comprises a cylindrical plug, a counterplug which is complementary thereto and a bayonet ring which can be rotated about the counterplug housing for the purpose of locking the plug into the counterplug. In order to lock off the plug connector, the bayonet ring can be pushed

on the housing of the plug in the direction of insertion, until at least one locking device of the bayonet ring has interlocked with the plug housing. Further, in order to unlock the plug connector, the bayonet ring can be rotatable about the counterplug housing.

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The combined action, according to the invention of the bayonet ring and the plug brings it about that the bayonet ring can simply be pushed in the direction of plug insertion. This means that in order to lock the plug into the counterplug, the bayonet ring is not rotated but pushed along the axis of the plug housing on the latter. The plug connector is loosened by means of rotating the bayonet ring.

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The invention offers the advantage that the plugs can be locked rapidly and reliably. The fitter only needs to press the counterplug on the plug. The fitting of such plug connectors takes place more frequently than their dismantling, since these plug connectors are only loosened when, for example, the gearboxes are serviced. In this way, in vehicle mass production, the fitting of such plug connectors is made more rapid without losing the advantages of a bayonet closure that is important in moving belt production. In contrast, a vehicle mechanic can spend the necessary time in carrying out repair work on a vehicle, making the time needed for the rotation of the bayonet ring in order to loosen the plug connector non-critical.

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Further advantageous developments of the invention are characterised in the subsidiary Claims.

25 An advantageous embodiment of the invention is that the locking device comprises at least one spring tongue with an inward-directed peg moulded onto the bayonet ring and running in the direction of plug insertion and that the circumference of the plug housing has at least one sliding channel which is suitable for receiving the peg. The start area of the sliding channel runs substantially at an angle to the direction of plug insertion. The terminal area of the sliding channel runs substantially parallel to the direction of plug insertion where the terminal area has at least one locking lug which can be negotiated by the peg, where both areas run into the front face of the plug housing. These further developments offer the advantage that the peg of the spring

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tongue and the locking lug of the terminal area achieve the locking of the plug connector. The sliding channel which runs parallel to the direction of plug insertion makes it possible for the bayonet ring to be pushed in the direction of plug insertion. On the bayonet ring being rotated, the start area of the sliding channel which runs at an angle forms a step-down, so that the dismantling of the plug connector is made easier.

A further advantageous embodiment of the invention is that the bayonet ring has at least one outward-pointing pin. Apart from this, the plug housing may have at least one lever arm, which can be rotated vertically to the direction of plug insertion in order to grip the pin. On actuating the lever arm, the required force of insertion is reduced.

A further advantageous embodiment of the invention is the fact that the bayonet ring has two diametrically opposite pins. The plug housing may have two diametrically opposite L-shaped lever arms that are connected by essentially semicylindrical C-straps. When the C-strap is actuated, both the L-shaped lever arms grip the outward-pointing pins. In a locked state, the C-hoop and its two L-shaped lever arms form an additional rotation lock.

Yet another advantageous embodiment of the invention consists in the fact that about the plug housing between a stop element and the direction of plug insertion a collar is arranged which can be pushed forwards or backwards. This makes it possible for the collar to shield the plug housing from possible soiling.

A further advantageous embodiment of the invention is that a pressure spring pushes against a first stop of the collar and against a second stop of a circlip so that in the event of incomplete insertion of the bayonet ring the latter will be pushed back through the front face of the collar. This offers the advantage that the fitter will immediately see when the bayonet ring is in the locking position so that if this locking position is not reached, the bayonet ring will automatically be pushed back through the collar.

A further advantageous embodiment of the invention is that following the complete insertion of the bayonet ring, the collar rests on the spring tongues. In this way, the collar acts as a secondary lock, since the spring tongues including pegs cannot come out of their locked position without hitting against the collar.

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An embodiment example of the invention is represented in the schematic diagram and will be described in greater detail below, as further particularities and advantages of the invention obtained

10 The following is shown by the figures:

Fig 1 a perspective view of a counterplug according to the invention, including bayonet ring;

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Fig 2 an exploded view of the plug according to the invention;

Fig 3a-3b a perspective view of the plug according to the invention with the plug from Fig 2 and the counterplug from Fig 1 in various positions;

20

Fig 4 is a schematic section along line A from Fig 3a;

Fig 5a-5d a part-enlargement of area E of Fig 4 in various positions.

Fig 1 shows an exploded view of a counterplug 1 with a bayonet ring 2 and a
25 counterplug housing 3. The cylinder-shaped bayonet ring 2 has on its outer circumference two outward-pointing pins 4 and three spring tongues 5, 6 and 7 each with an inward-pointing peg 8. The counterplug housing 3 has, along the direction of plug insertion, electrical contact chambers 9 which can be locked with the coding 11 by means of a cross slide 10. The counterplug housing 3 which is also cylindrical has
30 on its circumference behind the cross slide 11 a profiled gasket ring 12 resting on a first guide rail 13 which runs over the entire circumference of the counterplug housing 3. Together with a second guide rail 14 which also runs over the entire circumference

of the counterplug housing, it encloses a rotation guide channel 15 to receive the bayonet ring 2.

Fig 2 shows an exploded view of a plug 20 according to the invention which fits into the counterplug 1. From left to right are shown an insert 21 with a cross slide 22 which also has a coding 29, a plug housing 23 with a swivelable strap 24, a circlip 25 with four outward-pointing second stop elements 26 and a substantively cylindrical collar 27. The insert 21 also chambers 30 which also run in the direction of plug insertion for the reception of electrical contacts, two outward-pointing diametrically opposite locking arms 31 on its circumference and a guide channel 32 also on its circumference, which runs in the direction of plug insertion. The insert 21 can be arranged in the front opening 33 of the plug housing 23.

The substantively cylindrical plug housing 23 has three sliding channels 34, each of whose start area 35 runs at an angle to the direction of plug insertion and whose terminal area 36 runs parallel to the direction of plug insertion. Both areas 35 and 36 run into the front face 37. A locking lug 41 which is enclosed by a ramp 39 and a plane 40 which runs parallel and vertically to the direction of insertion, is moulded on in the terminal area 36 of the sliding channel 34 in the vicinity of the front face 37 (cf Fig 4/Fig 5). On the circumference of the plug housing 23 there are two diametrically opposite, outward-pointing studs 45 which are located at approximately the same distance from the front face 37 and the rear face 46. The C-shaped substantively semicylindrical strap 24 links two substantively L-shaped lever arms 47 and 48 whose one end 49 are arranged to swivel about the stud 45. On the level of the stud 45 along the circumference of the plug housing 23 is a moulded-on outward-pointing rail 50. From this rail 50 run parallel to the direction of insertion two side walls 51 and 52, which terminate in the vicinity of the rear face 45 and enclose a spring chamber 55.

Altogether there are provided, arranged on the circumference of the plug housing 23 and offset by 90° four such spring chambers 55 including sidewalls 51 and 52. A channel 56 to receive the circlip 25 is incorporated in the rear face 46.

The front part 60 of the substantively cylindrical collar 27 has a bigger radius than in its rear Part 61. Diametrically opposite one another and running in the direction of plug insertion and into the front area are provided two recesses 62 for the strap 24. Inside the rear part 61 are located to fit into the spring chambers 55, a first stop 63 and
 5 parallel to the direction of plug insertion two guide walls 54 whose distance apart is so chosen that the side wall 51 and 52 can slide in between. Further, on the level of the first stop 63 an inward-pointing partly interrupted sliding shoulder 65 is moulded on, whose inside radius is so chosen that the sliding shoulder can be led to the shell surface 53 of the plug housing 23 between the side walls 51 and 52.

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To build up the plug connector, the chambers 9 and 30 are first fitted with electrical contacts and then locked by the corresponding cross-slides 10 or 22. In the case of the counterplug 1, the next step is that of drawing the bayonet ring over the housing 3, so that the shoulders 17 of the bayonet ring 2 which are not shown in Fig 1 reach the
 15 guide channel 15. In the case of the plug 20, the insert 21 is introduced into the opening 33 of the plug housing 23 until the locking arms 31 are locked in there. As the next step, the collar 27 is pushed on the plug housing 23 in such a way that the stop 63 arrives between the corresponding sidewalls 51 and 52 until it strikes against the rail 50. Thereafter, each of the four spring chambers 55 is fitted with a pressure
 20 spring, which is not shown. The circlip 25 is then introduced into the channel 56, so that the second stops 26 are arranged between the side walls 51 and 52, reach the pressure spring 66 and close the spring chamber 55.

Following the assembly of the plug and the counterplug, they can be inserted into one
 25 another as explained below.

Figs 3a to 3d show in perspective a plug connector in various positions with the counterplug 1 from Fig 1 and the plug 20 from Fig 2.

30 Fig 3a shows the plug connector according to the invention at the initial stage of the insertion process. When the lever is swivelled downwards, the free end 44 of the lever 47 reaches the pin 4. As will also be explained below, the spring tongues 5 – 7 are lifted so that their free ends 19 reach the front face 70 of the collar. If the strap 24 is

swivelled further towards the plug connector, the free end 44 of the lever 47 grips the pin 4 so that the bayonet ring 2 is pushed over the plug housing 23 and the outward-protruding spring tongues 5, 6 and 7 engage the collar 27. As will be explained more fully below, during this process the pressure spring 66 will be compressed between

5 the first stop element 63 and the second stop element 25, because the distance between these stops 26 and 63 is reduced by the downward swiveling of the strap 24, as can be seen from the dotted-line representation in Fig 3b. If the pegs 4 reach the bend 43 of the lever 47, then the spring tongues 5, 6 and 7 release the collar 27 by locking the latter inwards. This position is shown in Fig 3b. Since the pressure spring

10 which is not shown here is under compression, the collar 27 is pushed in the arrow direction D until the first stop 63 reaches the rail 50 as can be seen in Fig 3c. In this way, the plug connector is in the locked position.

To open the plug connector, the strap 24 must first be swivelled so that a right-hand

15 thread in the arrow direction C (cf Fig 3d) can rotate the bayonet ring 2. In the process, the pegs 8 in the starting area 35 of the sliding channel 34 slide to the front face 37. The housings 3 and 23 move away from one another. The plug connector is loosened as soon as the pegs 8 have left the sliding channels 35.

20 Fig 4 shows a section along the line A of the plug connector according to the invention from Fig 3a, where the bayonet ring 2 has been pushed some way on the plug housing 23, but the spring tongues 5 to 7 have not yet been lifted. Starting from the left, it is possible to see outside the bayonet ring 2 with the moulded-on spring tongues 5, on which the substantially cylindrical peg 8 is moulded-on via its angled

25 edge 16. The shoulder 17 of the bayonet ring 2 is in the guide channel 15 of the counterplug housing 3, so that the bayonet ring 2 is placed to be able to rotate about the counterplug housing 3. Behind the first guide rail 13 is the profiled gasket ring 12.

Outside on the right-hand side is shown the bayonet ring 27 with the front part 60 and

30 the rear part 61. The collar 27 is located around the plug housing 23, so as to be able to rotate owing to the first stop 63 and the sliding shoulder 65 of the collar 27 which slide on the shell surface 53 of the plug housing 23. The rear part 61 of the collar 27, the first stop 63, the second stop 26 and the shell surface 53 enclose the spring

chamber 55. Fig 4 shows clearly that the insert 31 in the plug housing 23 is arranged against cable admission shafts 28 of the plug housing 23. In contrast with Fig 3a, the section A-A of Fig 4 passes through the centre of the strap 24 as can be seen in the lower part of Fig 4. Starting from the front face 37 of the plug 20 can be seen the
 5 locking lug which is moulded on the terminal area 36 of the sliding channel 34. With the pressure spring 66 slack, this area (the locking lug 41 and the sliding channel 34) are overlapped by the front part of the collar 27.

Below, Figs 5a to 5d show the combined effect of the spring tongues 5 to 7 and the
 10 locking lugs 41 and the front face 70.

Figs 5a to 5d show a schematic part-enlargement of the area E from Fig 4 at various stages of the plug insertion process. For simplicity, only the spring tongue 5 with the formed-on peg 8 of the bayonet ring is shown. On the right-hand side of Figs 5 can be
 15 seen a part of the collar 27 in the upper part and underneath a part of the plug housing 23. At the rear end of the plug housing 23 is shown a part of the circlip 25 with the second stop 26. In addition to Fig 4, Fig 5 shows the pressure spring 66 between the first stop 63 and the second stop 25. As can be seen in the Figures, the section passes through the locking lug 41 which is enclosed by an angled or slightly rounded ramp
 20 38, a plane 39 which is parallel to the direction of plug insertion and a vertical plane 40.

Figs 3 and 5 explain the manner of operation of the process of plug insertion. The fitter introduces the counterplug 1 from Fig 1 into the plug 20 from Fig 2, so that the
 25 codings 11 and 29 grip correctly. During this process, the bayonet ring 2 reaches the plug housing 23 as seen in Figs 4 and 5a. The pressure spring is still slack, since the distance between the first stop 63 and the second stop 26 is at its maximum.

If the bayonet ring is pushed further on the plug housing, with or without the strap 24 as shown in Fig 3a, the spring tongue 5 with the moulded-on peg 8 of the bayonet ring
 30 2 approaches the locking lug 41.

By further pushing of the bayonet ring 2, the angled edge 16 of the peg 6 reaches the ramp 38 so that the spring tongue 5 is lifted and projects above the shell surface of the bayonet ring 2. The free end 19 of the spring tongue 5 reaches against the front face 70 of the collar 27 as shown in Figs 3 a and 5d. If the bayonet ring 2 is pushed further by spring arm 5, the collar 27 is pushed back in the arrow direction H, whereby the distance between the stop 63 and the second stop 26 is reduced. During this process, the first stop 63 moves away from the shoulder 50.

If the bayonet ring 2 is pushed further on the plug housing 23 whether by hand or via the strap 24, then the locking lug 41 is negotiated by the peg 8 so that the vertical plane 40 rests against the vertical plane 18 of the peg 8. The spring tongue 5 releases the collar 27, whereby the distance between the first stop 63 and the second stop 26 reaches its minimum, that is to say, the pressure spring 66 has maximum force at this stage (Fig 3b and Fig 5c). When the collar 27 is released, the spring 66 which is under compression can release its energy and push the collar 27 back in the arrow direction D, as shown in Figs 3b and 5c. The first stop 63 again approaches the shoulder 50, until they are again in contact. The front area of the collar 27 overlaps the spring tongue 5, so that the latter cannot jump out of its locked position (as shown in Fig 3c and Fig 5d). The position of the collar 27 from Fig 5d corresponds to the position in Fig 5a, where the counterplug 1 has now been fully inserted into the plug 20 and the spring tongues 5-7 are locked in. Neither can the spring tongues 5-7 come out of their locked position owing to the front area 60 of the collar 27, nor is a rotational movement of the collar 27 possible, since the strap 24 effectively encloses the pins 4. In this way, a plug connector is obtained which is secure and unusually difficult to loosen.

It should be noted that when the fitter releases either the bayonet ring 2 or the lever 24 prematurely, that is to say, for example, in the position shown in Figs 3a and 5b, the collar 27 is pushed in arrow direction D by the power of the compressed spring 66 until the first stop 63 reaches the rail 50. In the process, the counterplug 1 including bayonet ring 2 is moved away from the plug housing 23. If a strap 24 is present, then this is also correspondingly swivelled, loosening the plug connector. If the plug

connector is not correctly locked, the combined action of the collar, the first stop, the second stop and the spring tongue enable a direct report of the fact to the fitter.

The previously described characteristics of the embodiment examples can be
5 combined with one another at will.

Claims

1. Electrical plug connectors with

5 - a cylindrical plug (20),

- a counterplug (1) which is complementary to plug (20),

 - a bayonet ring (2) which is rotatable about the housing
 - (3) of the counterplug (1) for locking the plug (20) into the counterplug,

10 characterised by the fact that the bayonet ring (2) for the locking of the plug connector in the direction of plug insertion can be pushed on the housing (23) of the plug (20) until at least one locking device of the bayonet ring (2) interlocks with the plug housing (23) and that the bayonet ring (2) for the unlocking of the plug connector can be rotated about the counterplug housing

15 (3)
2. Plug connector according to Claim 1, characterised by the fact that locking device has at least one spring tongue (5,6 and 7) moulded on the bayonet ring (2) and running in the direction of the plug insertion with an

20 inward-pointing peg (8) and that the circumference (53) of the plug housing (23) has at least one sliding channel (34) which is able to receive the peg (8).
3. Plug connector according to Claim 2, characterised by the fact that the starting area (35) of the sliding channel (34) runs substantively at an angle to

25 the direction of plug insertion and that the terminal area (36) of the sliding channel (34) runs substantively parallel to the direction of plug insertion, where the terminal area (36) has at least one locking lug (41) which can be negotiated by the peg (8), where both areas (35,36) run into the front face (37) of the plug housing (23)

30
4. Plug connector according to Claims 1, characterised by the fact that the bayonet ring (2) has at least one outward-pointing pin (4) and that the plug

housing (23) has at least one lever arm (47, 48) which can be rotated vertically to the direction of plug to grip the pin (4)

5 5. Plug connector according to Claim 4 characterised by the fact that the bayonet ring (2) has two diametrically opposite pins (4) and that the plug housing (23) has two diametrically opposite L-shaped lever arms (47, 48) which are linked together by a substantively semicylindrical C-strap (24)

10 6. Plug connector according to Claim 1, characterised by the fact that a collar (27) which can be pushed forwards or backwards in the direction of plug insertion is arranged about the plug housing (23)

15 7. Plug connector according to Claim 6, characterised by the fact that the stop element is a circlip (25) which can be fixed to the circumference of the plug housing (23)

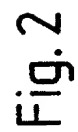
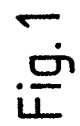
20 8. Plug connector according to Claim 6, characterised by the fact that a pressure spring (66) rests against a first stop (63) of the collar (27) and against a second stop (26) of the circlip (25), so that in the case of an incomplete insertion of the bayonet ring (2), the latter is pushed back through the front face (70) of the collar (27)

25 9. Plug connector according to Claim 1, characterised by the fact that after the complete insertion of the bayonet ring (2), the collar (27) rests on the spring tongues (5,6 and 7)

Electrical plug connector, in particular for automotive applications

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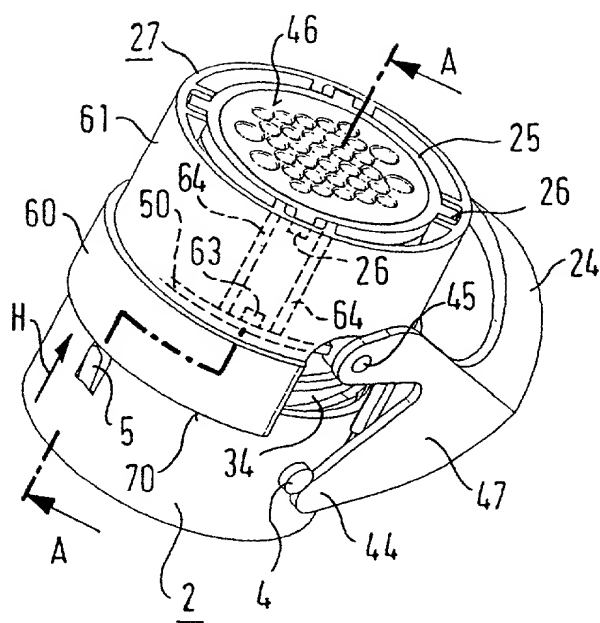


Fig. 3a

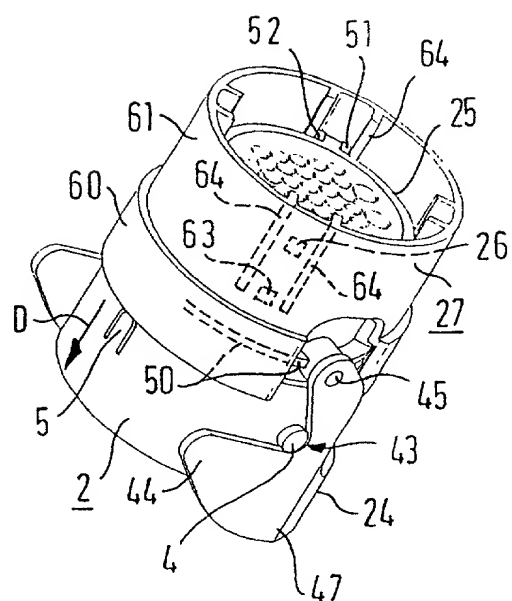


Fig. 3b

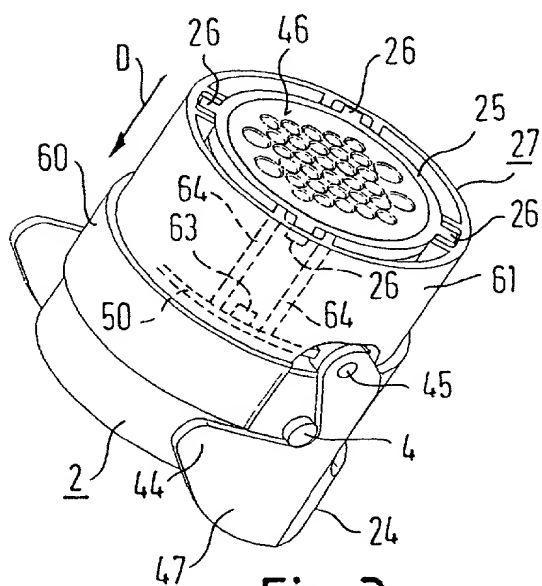


Fig. 3c

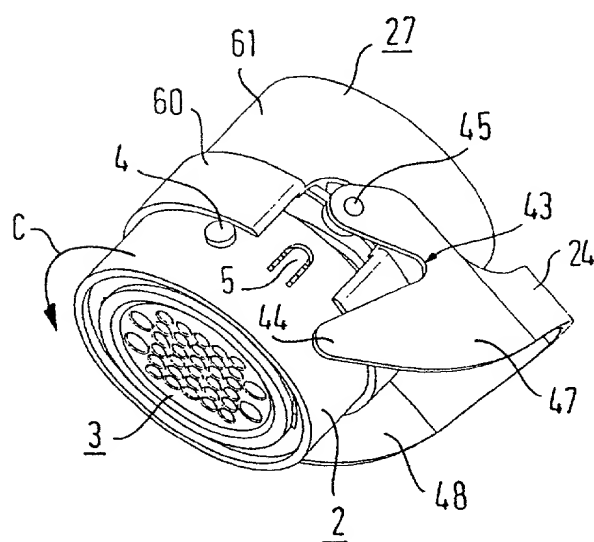


Fig. 3d

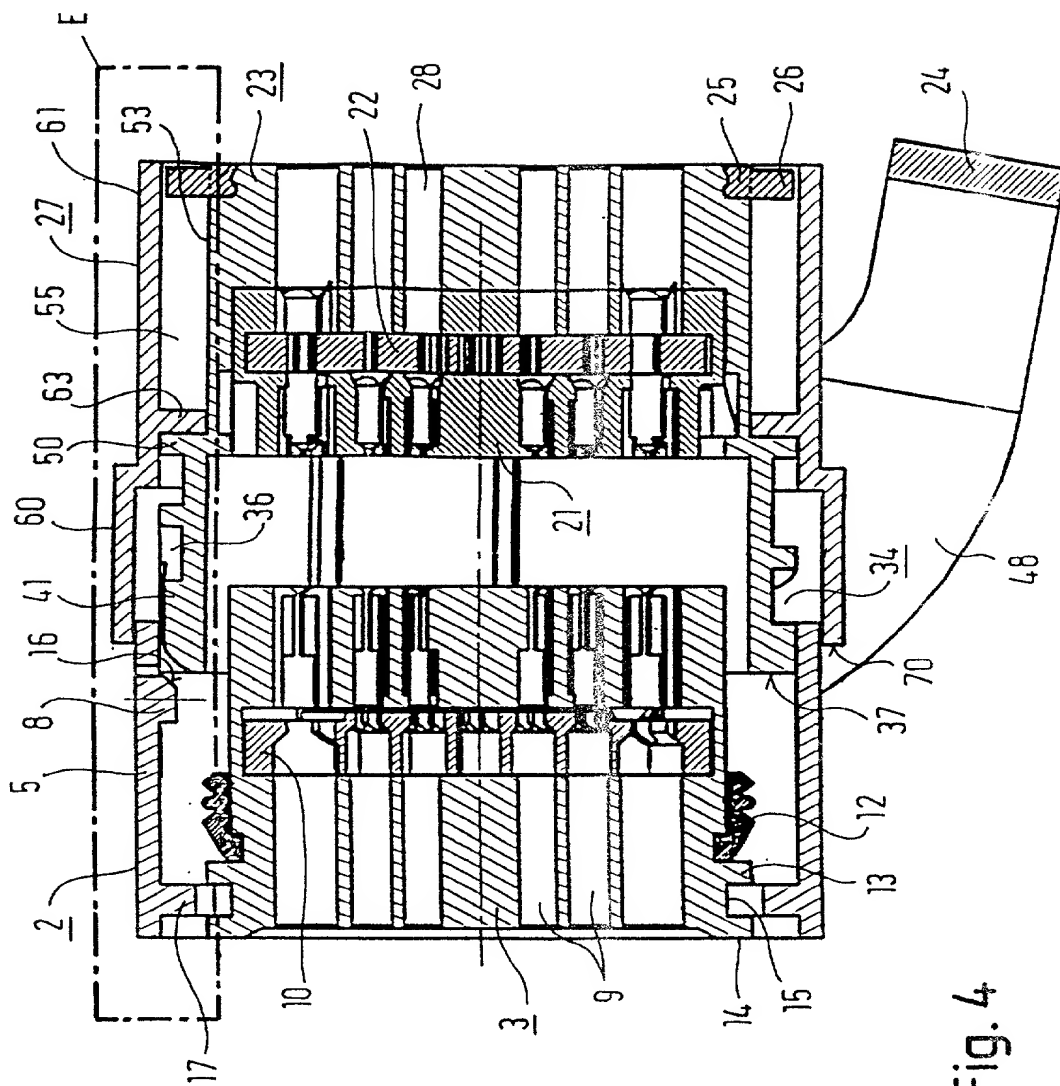


Fig. 4

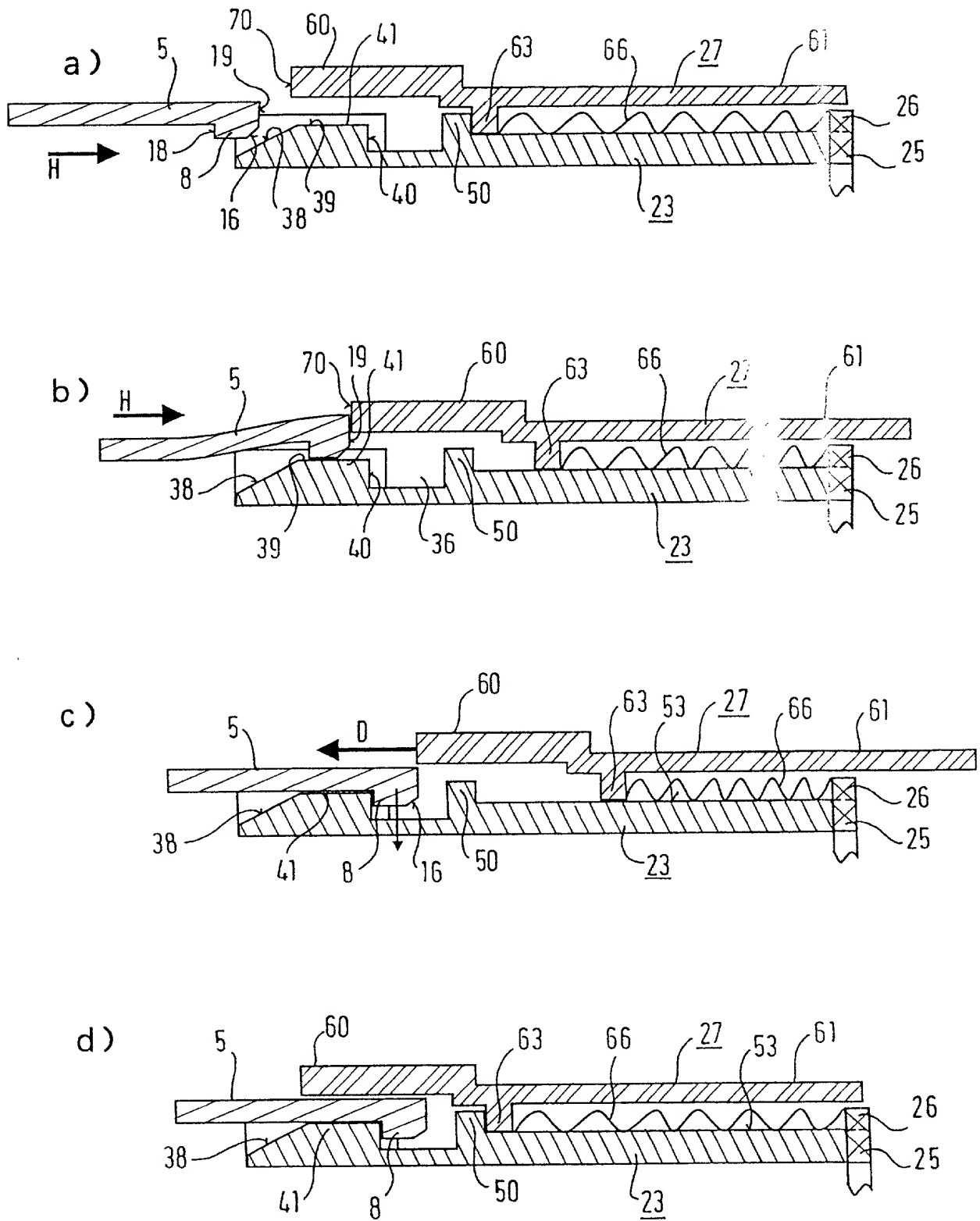


Fig. 5